

REMARKS

The present Supplemental Amendment amends claims 1, 3, 11 and 19 and leaves claims 2, 4-10, 12-14 and 20 unchanged. Therefore, the present application has pending claims 1-14, 19 and 20.

Interview Summary

Applicants thank the Examiner for granting the interview conducted on September 3, 2008. In the interview, Applicants' representative discussed proposed amendments to the claims and described distinguishing features of the present invention, arguing that these features are not taught or suggested by the cited references, particularly Arimilli and Moran. The Examiner indicated that the features of the present invention, as described by Applicants' representative, appeared to distinguish over Arimilli and Moran. However, the Examiner recommended further amending the claims to more clearly recite features of the present invention. The Examiner also indicated that although the features, as described, appeared to overcome the cited references, further search and consideration would be required.

Accordingly, in this response, Applicants have further amended the proposed amendments to the claims to incorporate the Examiner's recommendations.

35 U.S.C. §103 Rejections

Claims 1, 3, 4, 8, 9, 11-13, 19 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U. S. Patent Publication No. 2003/0009640 to Arimilli et al. ("Arimilli") in view of U. S. Patent No. 7,139,890 to Moran et al. ("Moran"). This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more

clearly recited in claims 1, 3, 4, 8, 9, 11-13, 19 and 20, are not taught or suggested by Arimilli or Moran, whether taken individually or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly recite that the present invention is directed to a cache control method, a relay device, a storage device, and a computer-readable medium as recited, for example, in independent claims 1, 3, 11 and 19.

One feature of the present invention, as recited in claim 1, and as similarly recited in claims 3, 11 and 19, includes where the attribute data is stored in a cache attribute management table which stores a plurality of entries, each of which sets a corresponding relation between identification information identifying one of the virtual volumes, identification information identifying at least two of the physical devices forming a part of the one of the virtual volumes, and the attribute data, which provides an indication whether data stored in the one of the physical devices is cacheable or not, and where the attribute data corresponding to each of the at least two of the physical devices may differ from one another. Neither Arimilli nor Moran discloses this feature.

As shown in Fig. 6, and as described in the accompanying text in paragraphs [0082] to [0083] of U.S. Patent Application Publication No. 2004/0186961 of the present application, the present invention includes a cache attribute management table 333. The cache attribute management

table 333 is provided for the reading and the writing of the data separately and stores the information indicating as to whether or not the data is cacheable for each virtual volume. Applying the disk device, which is divided into the plurality of physical volumes, enables setting of the cache operation, cacheable or non-cacheable, for each physical volume. For example, an example in Fig. 6 shows that the data stored in the physical volume PD11 is cacheable while the data in the physical volume PD12 is non-cacheable when reading the data in the virtual volume VDa.

This feature of the present invention is not taught or suggested by either Arimilli or Moran. To support the assertion that the prior art teaches a cache attribute management table, the Examiner relies upon Arimilli, citing Fig. 4. However, the page table entry (PTE) 82 of Arimilli is not the same as the cache attribute management table 333 as recited in the claims of the present invention.

Another feature of the present invention, as recited in claim 1, and as similarly recited in claims 3, 11 and 19, includes where when one physical device of the at least two of the physical devices is shared by a first virtual volume and a second virtual volume, the attribute data corresponding to the first virtual volume indicates that data stored in the one physical device is cacheable, and the attribute data corresponding to the second virtual volume indicates that data stored in the one physical device is not cacheable. Neither Arimilli nor Moran discloses this feature.

As described in paragraph [0083] of U.S. Patent Application Publication No. 2004/0186961 of the present application, Fig. 6 illustrates where the physical volume PD12 is shared by virtual volumes VDa and VDb. Sharing

the physical volume among a plurality of virtual volumes may thus be applied in this embodiment. In this example, the data stored in a shared physical volume is shared among a plurality of clients corresponding to respective virtual volumes. An example in the figure shows that the cache attribute of a share physical volume PD12 is defined to non-cacheable. In an alternative application, as recited in the claims, the cache attribute of the shared physical volume PD12 for VDa and VDb may be different. This alternative application enables the cache operation to be switched depending on the client. In one applicable example, the cache operation is allowed at the reading of the data from the virtual volume VDa while the cache operation is restricted at the reading from the virtual volume VDb. Arimilli and Moran do not disclose this feature.

Therefore, Arimilli and Moran fail to teach or suggest “wherein said attribute data is stored in a cache attribute management table which stores a plurality of entries, each of which sets a corresponding relation between identification information identifying one of said virtual volumes, identification information identifying at least two of said physical devices forming a part of said one of said virtual volumes, and said attribute data, which provides an indication whether data stored in said one of said physical devices is cacheable or not” and “wherein said attribute data corresponding to each of said at least two of said physical devices may differ from one another” as recited in claim 1, and as similarly recited in claims 3, 11 and 19.

Furthermore, Arimilli and Moran fails to teach or suggest “wherein when one physical device of said at least two of said physical devices is shared by a first virtual volume and a second virtual volume, said attribute

data corresponding to said first virtual volume indicates that data stored in said one physical device is cacheable, and said attribute data corresponding to said second virtual volume indicates that data stored in said one physical device is not cacheable” as recited in claim 1, and as similarly recited in claims 3, 11 and 19.

Both Arimilli and Moran suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Arimilli and Moran in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 1, 3, 4, 8, 9, 11-13, 19 and 20 as being unpatentable over Arimilli in view of Moran are respectfully requested.

The arguments presented in the Amendment filed on July 11, 2008 with regard to each of pending claims 1-14, 19 and 20 are incorporated herein by reference.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 1-14, 19 and 20.

In view of the foregoing amendments and remarks, Applicants submit that claims 1-14, 19 and 20 are in condition for allowance. Accordingly, early allowance of claims 1-14, 19 and 20 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (Referencing Attorney Docket No. 1288.43131X00).

Respectfully submitted,
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